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ABSTRACT

The purpose of this project was to compare the reading levels of students in vocational programs in a two-year community college with the readability levels of the materials they were required to read in their daily learning activities. The Diagnostic Reading Test, Form A, was administered to 120 students in five different occupational courses. Twelve texts for the five classes were evaluated for reading difficulty using the Dale-Chall formula. Of the twelve texts evaluated for the five different classes, nine proved to be inappropriate for the learners on the basis that a text should not be more than one grade level above the reading ability of the student who uses it. It was recommended that publishers be urged to advertise the readability levels of specific texts and other materials in order to ensure that unsuspecting or untrained instructors do not make an inappropriate selection. (WR)

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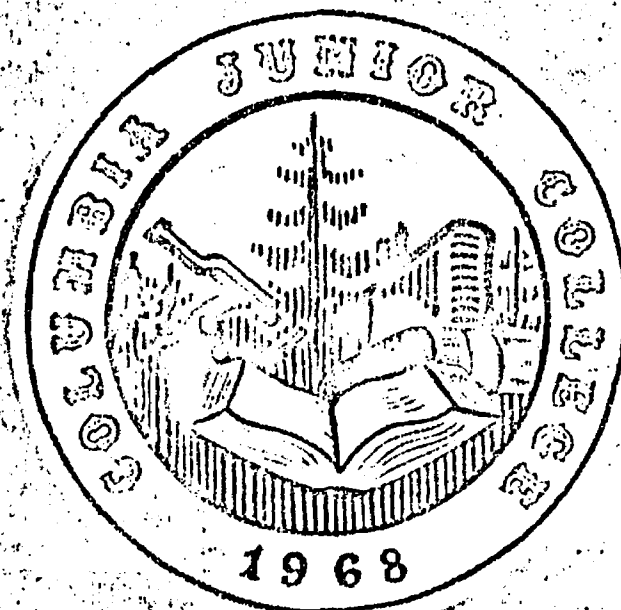
# A Comparison of the Reading Abilities of a Junior College Occupational Education Population and the Readability Levels of their Texts

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A Vocational Education Project Under  
Title I, Part C, Sec. 131 [b] of PL 90-576  
and CRCU Small Grant Projects

Jon M. Hagstrom  
Principal Investigator

## A DESCRIPTION OF THE PROJECT

### PURPOSE

The purpose of this project was to compare the reading levels of students in vocational programs in a two year community college with the readability levels of the materials they were required to read in their daily learning activities. Research findings were concerned with identifying discrepancies in reading-readability levels which affect the student's success rate, modifications required, and identifying useful information for vocational instructors who design their own learning materials.

The expected contribution of this research project is to provide a means whereby the correlated learning materials utilized in the instructional program can be brought into closer relationship to the ability level of enrolled students. This factor is of critical importance in the development of audio-tutorial programs and other individualized instruction programs.

### OBJECTIVES

The objectives of this project were to:

- A. Gather base data concerning the reading level of students enrolled in vocational programs at Columbia Junior College.
- B. Determine the readability level of all written materials assigned to students in vocational courses offered during the Winter Quarter of 1973.
- C. Compare the reading levels of the students enrolled and the materials which they were assigned to read.
- D. Derive the implications for structuring the learning experience through the selection of written materials to achieve the maximum level of student success.

# A COMPARISON OF THE READING ABILITIES OF A JUNIOR COLLEGE OCCUPATIONAL EDUCATION POPULATION AND THE READABILITY LEVELS OF THEIR TEXTS

by Jon M. Hagstrom  
Columbia Junior College

In the summer of 1969 this writer conducted a study of readability of textbooks for three different courses at Columbia Junior College. In addition to the report of the readability levels for the various texts, suggestions were also made on how students could best cope with these texts in terms of the table of contents, the index, the glossary, the end-of-chapter questions, etc. As part of the report, in other words, suggestions were made on how the student could best study-read the text. While conducting the readability portion of the study, it soon became apparent that the majority of the texts being evaluated were beyond the reading abilities of many of the students for whom they were intended. Two of the three texts in one course, for example, were rated on the Dale-Chall formula at grade 16 or graduate level in difficulty. These texts were being used by students in a non-transfer terminal course in introductory biology. Even without testing the students for their reading ability, it would be logical to assume that the students would not be able to effectively deal with these textbooks and learn from them.

In another instance the Dean of Occupational Education at Columbia asked that a readability analysis be run on two of the texts then used in

the Carpentry Apprenticeship program. While the results from the analysis were not disproportionately out of line with what was the supposed reading abilities of the students in the apprenticeship program, there were other factors about the texts which made them difficult to read. Chief among these factors was the range of difficulty of the written portions of the texts. These widely varying ranges of difficulty were often encountered within the same chapter. In one chapter, for instance, the difficulty as measured by a readability formula began at grade seven, jumped to grade 13, and then back to a grade level difficulty of 9, all within a 26 page chapter. All of these grade levels of difficulty were within the reading ability ranges of the students, but the fact remains that in textual materials such inconsistency will prove at the very least distracting for the reader.

A disturbing factor of this kind is not as serious a shortcoming in texts as are others such as a large gap between the student's reading ability level and the difficulty level of written material, but such a distracting influence is nonetheless contrary to the purpose for which books are written.

In order to determine whether in fact there were significant discrepancies between student's reading abilities and the graded difficulty levels of the materials they were asked to read in their occupational courses, it was decided to conduct a more thorough study. This more thorough study would entail two primary factors: the assessment of the reading abilities of the students in the various occupational courses at the College and the assessment of the readability levels of the texts and teacher-prepared materials used by these same students in their course work.

It should be made clear at the outset that this study was not conducted to provide definitive research data or to provide an example of how pure research should be carried out. It was conducted to hopefully provide some answers to some vexing questions, to provide teaching colleagues with some information about one or two of the characteristics of their students, and to provide some information for the feeder high schools about the characteristics of their students. It was hoped, in addition, that teaching colleagues in other disciplines would learn about and begin to appreciate the significant relationship between the reading abilities of their students and the difficulty levels of the materials with which they were asked to deal. It was one of the aims of the study, in fact, to generate enough interest in this reading ability-readability relationship to conduct in-service workshops to teach instructors how to apply a readability formula when making textbook selections.

This study, then, is not research looking for an application, it is an application looking to answer some questions within a community college setting.

#### CHARACTERISTICS OF THE POPULATION

Columbia Junior College as a college in the California Community College system, is an open door institution. As such the student body is representative of the general population of the area served and includes students whose academic aptitudes range from the lowest to the highest level on any scale. A primary concern of the institution as reflected in

its philosophy and guiding principles is that the open door does not become a revolving door, but rather helps each student to achieve that level of success of which he is capable by carefully structuring the learning situation. In this setting, texts and the teacher become secondary in importance, while the structuring of the learning experience for each individual participant is the primary responsibility of the institution.

In its five years of operation, the instructional program at Columbia Junior College has been developed to place maximum emphasis on the involvement of a carefully structured series of learning experiences which will allow each individual participant to achieve progressively higher levels of learning in the selected area based on his own rate of learning. The instructional program is based on the large group, small group, and individual study organization. Much emphasis is given to individualizing learning and providing learning experiences through which students may progress at their own pace. Many of the materials used in the classes are teacher prepared.

On the basis of five years experience in the development of such an instructional approach, it has become apparent that greater attention must be given to devising the means by which the student is assured the optimum opportunity to achieve success in his individual learning program. At least a part of that concerns the relative difficulty of the course materials in the students' individual learning program.

In a study conducted by Belden (1) the author states, "If course materials are on a level above the reading skill of the students, frustration, anxiety and failure result. Without doubt, the relationship between the

difficulty of material and the reading ability of the students present one of the most pressing problems for those who rely upon printed materials for learning experiences." In view of this observation and in view of the fact that the instructional approach in occupational education at Columbia Junior College still relies heavily on printed materials for learning experiences, it was decided to pursue the question presented earlier. That question restated is--to what extent, if at all, is there a difference between the reading abilities of students in selected classes and the readability difficulty of the texts used in those classes?

During the period of time when this study was conducted there were 260 students enrolled in occupational programs in the College. Of those 260 students, 121 or 46.6 percent were tested in five different occupational courses. In these five different courses a total of 12 different texts and teacher-prepared materials were used.

It may be appropriate at this juncture to describe the nature and character of the instruments used in the study. The Diagnostic Reading Test (7) is a nationally normed reading test commonly used in high schools, colleges, and universities throughout the country. The test has a variety of different forms, but Form A, the form used in the study, has, in the opinion of many reading specialists, the greatest validity for research purposes. The test itself has a 40 minute working time and renders scores in reading rate, vocabulary, and comprehension. The comprehension score is a composite of results from two kinds of reading comprehension, general reading and what might be called academic reading. In addition to the three scores mentioned above there is a Total Score, a score which reflects an average of



the other three scores. All four of these raw scores can be converted to grade levels by using the data tables supplied by the test makers. Great care must be exercised in drawing conclusions from any particular set of data, especially when that data was normed nationally quite some time ago. If, however, the interpreter-reader observes rules of common sense he can make relatively sound inferences which may help the practitioner learn more about the characteristics of his students.

The Dale-Chall Readability Formula (2) is one of many readability formulas, but it was used in this study because it has, according to many specialists, the greatest reliability. The Dale-Chall Formula is the formula against which newer formulas are measured. The formula itself requires the counting of several hundred word samples, the determination of the numbers of sentences in the samples, and the counting of unfamiliar words when compared to the Dale-Chall list of 3000 familiar words. All of these factors, then, are treated statistically and the treatment renders a corrected grade level of the reading material being rated.

### THE PROCEDURE

Early in the Winter Quarter, 1973, testing of the selected classes was begun. The Diagnostic Reading Test, Form A was administered to a total of 121 students in five different occupational courses. None of the students were tested more than once. Those students who had taken the test previously were excused from class for the testing period.

The results of this reading test are shown in Table I. This table reveals that 28.10 percent of the population tested were reading at or above

TABLE I  
Initial Reading Grade Placement of Population

<u>Reading Grade Level</u>	<u>N</u>	<u>Percent Of Population</u>
6th Grade	5	4.13
7th Grade	8	6.61
8th Grade	4	3.31
9th Grade	8	6.61
10th Grade	25	20.66
11th Grade	8	6.61
12th Grade	29	23.97
13th Grade	34	28.10
	<u>121</u>	<u>100.00</u>

grade level 13. Those reading slightly below grade level or at grades 10, 11, and 12, constitute 51.24 of the population. A percentage of 16.53 of the population were reading at a grade level of 7, 8, and 9, or junior high school level. Those reading below the seventh grade level of ability comprise 4.13 percent of those tested. In an overview, then, slightly under one-third of the tested group were reading at or above grade level, while a little more than two-thirds were reading below their grade level.

According to McClellan (6) who cites Halfter (4) and Hadley (3), these results are in line with other studies of a similar kind. And while it may be somewhat comforting to find that similar studies have revealed like results, it is truly disturbing to contemplate the seriousness of the fact that approximately two-thirds of a freshman class will have a crippling reading handicap.

At the same time that the testing was being conducted, assistants were being interviewed, selected, and trained to help conduct the readability analysis of the numerous texts using the Dale-Chall formula. Three assistants were finally selected and trained and began work in late January. Those assistants did the major portion of the sample taking, the counting of sentences in the samples, and the determining of unfamiliar words when compared to the Dale-Chall list of 3000 familiar words. The computational tasks, however, were closely supervised and checked by the investigator.

Table II shows that in a number of cases the required texts for the courses are somewhat inappropriate when compared with the average reading achievement of the class.

In the Vocational Nursing program, for example, there are six required texts, only two of which may be said to be appropriate for the entire class.

TABLE II

A Comparison of the Average Reading Ability of Six Classes  
and the Corrected Grade Level of Texts for Those Classes

<u>Class</u>	<u>No. Required Texts</u>	<u>N</u>	<u>Class Rd. Grade Level</u>	<u>Corrected Grade Level of Texts</u>
Vocational Nursing	6	21	11.4	1. 9-10 2. 11-12 3. 13-15 4. 13-15 5. 16 6. 16
Forest Technology	2	47	11.1	1. 11-12 2. 13-15
*Business (Office Occupations)	1	19 7	20A 10.1 20B 11.8	1. 11-12
Fire Science	1	12	10.7	1. 11-12
Heavy Equipment	2	15 121	9.6	1. 11-12 2. 13-15

\*Same text used but divided into beginning and advanced courses.

The other four texts at grade levels 13-15 and 16 or graduate level in difficulty are, if we consider the class average reading grade level of 11.4, probably not going to be of sufficient value to the students to learn from them at maximal levels. At least it can be said of the texts required in the Vocational Nursing course that two texts are probably suitable even if four others are not. In those classes where only one text is used, however, and where that one text is beyond the capabilities of the majority of the class members, the student is really handicapped. Such is the case with the Fire Science class. The corrected grade level of the text is 11-12, while the class reading grade level is 10.7. To expect that the majority of students will optimally learn from this text is questionable. The one text required in the Office Occupations course presents a different kind of problem. The text has a corrected grade level of 11-12 and is appropriate for use by those students in the "B" section of the course, but this same text is probably not going to be as useful for the 19 students in the "A" section.

Rather than looking only at the class reading grade level and comparing that to the difficulty level of the text or texts required, it may be instructive to look at the actual reading ability range of a representative class. The Forest Technology class has the largest population of the five classes in the study. In this class two texts were required, one having a corrected grade level of 11-12 and the other having a corrected grade level of 13-15. The class as a whole has a reading ability grade level of 11.1 and there were 47 students tested. Of these 47 students only 16 are reading at or above their grade level while ten more are reading one year below their grade level at grade 12. Of the 21 remaining students, four

are reading at grade 11, ten are reading at grade level 10, and the rest are at or below ninth grade reading ability as measured by the test. Thirty-one of the forty-seven students in this class, in other words, will probably experience difficulty in dealing with one of the texts. Seventeen of the forty-seven will have difficulty with both texts.

In another instance, this time with the Heavy Equipment class of 15 students with a class reading grade level average of 9.6, the two texts have a corrected grade level of 11-12 and 13-15. Four of these 15 students are reading at grade level, one is reading at a level slightly below or at twelfth grade reading ability level, while the remaining ten students are reading below the tenth grade level. Four of these ten are reading at or below the seventh grade level. In view of the graded difficulty level of the texts for this class, it would seem logical to assume that the majority of students in this class would find it difficult to learn from the printed material.

#### CONCLUSIONS AND RECOMMENDATIONS

Of the 12 texts evaluated for the five different classes, nine of them proved to be inappropriate for the learners if we say that a text should not be more than one grade level above the reading ability of the student who uses it. If, in addition, the results of this study are borne out by replication in other college settings, it would appear imperative that readability as a factor in textbook selection be championed throughout our colleges.

It may be argued and correctly so that the texts for a course in most colleges and universities, particularly in vocational programs, are not the

only materials used for instruction, but it is also true that texts and other written materials constitute a primary means of instruction for the learner. And while it is also true that many of our colleagues in other disciplines have expressed genuine concern about the reading abilities of their students, they have at the same time almost totally disregarded or have been ignorant of the importance of the difficulty levels of the materials they choose for their classes. It is incumbent upon the reading specialist, therefore, not only to provide evidence that such discrepancies do exist but he must also be willing to make an effort to inform his colleagues how to employ the tools which measure readability.

It may be, however, that the Dale-Chall readability formula used in this study, or any other similar formula for that matter, does not adequately measure the kinds of factors which need to be measured in textbooks. It is therefore recommended that other kinds of devices or formulas be developed which would more adequately assess many more characteristics than are currently measured by extant readability formulas. A scale could be developed, for example, which would include in addition to readability levels such factors as the existence and usefulness of such author-publisher aids as indexes, glossaries, end-of-chapter questions, chapter summaries, et cetera. These factors when weighted and coupled with traditional readability levels might provide the untrained instructor with more adequate information for textbook selection.

The final responsibility for the choice of written materials for classroom use rests with the instructor, but publishers also have a major responsibility here. It is therefore recommended that all of us urge publishers to take into consideration the readability levels of texts when

they approach specific markets. Publishers should also be urged to advertise the readability levels of specific texts and other materials in order to ensure that unsuspecting or untrained instructors do not make an inappropriate selection. Some publishers and teaching colleagues may argue that readability formulas as they currently exist have serious limitations because they do not measure concept difficulty. This is generally true, but, as Martin has said, "Without some reliable measure of difficulty those who need to be able to match reader ability and difficulty level can rely only on judgment. Trained judgment can be good, but there is general agreement that, even with its limitations, a good formula can be better."(5)



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